



THE STATE OF **KIRIBATI'S**
BIODIVERSITY FOR FOOD AND
AGRICULTURE

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Kiribati Country Report

State of Biodiversity for Food and Agriculture

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1.0 Assessment and monitoring of biodiversity for food and agriculture

1.1 General context

Kiribati is a low-lying island nation in the Pacific region, comprised of 33 atoll islands which are divided into 3 main island groups - Gilbert, Phoenix, and the Line group. All islands in these 3 groups are of limestone formation with 27 true atolls, 5 table reef islands, and 1 raised atoll. All true and reef islands have an averaged elevation of 4 m above mean sea level while Banaba as the only raised atoll, rises to about 78 m above mean sea level. The 33 islands are dispersed over 3.6 million km² of the equatorial central Pacific Ocean. Individual island size ranges from a mere 5 km² (Tamana Island) to 364 km² (Kiritimati Island - known as the largest atoll in the world). In total, the 33 islands make up the total land area of Kiribati which is about 800 km².

Kiribati climate is hot and humid year around. The tropical climate is closely related to the temperature of the oceans surrounding the atolls and small islands. However, its seasonal rainfall is highly variable from year to year and between the three islands groups. Two seasonal cycles are wet and dry seasons. Wet season is from September to February while dry period is from March to August. Intense tropical cyclones are rare in Kiribati - strong westerly winds of up to around 37 knots occasionally hit Kiribati islands. A phenomenon known as El Niño Southern Oscillation (ENSO), caused by the lateral movement, usually to the east, of ocean surface temperature and pressure, manifests itself as shifts in weather patterns bringing prolonged rain during the El Niño event and extended drought period during La Niña event. Such events result in deviations from the normal wet and dry seasons of Kiribati. The anomaly in weather pattern caused by ENSO has become more frequent due to climate change induced by global warming.

Kiribati population in the 2010 census was 103,058, of whom 50.7% were female and 49.3% male. With the agriculture and fisheries sectors, at the age of 15 and over there were 7,425 skilled agriculture and fisheries workers of whom 84.3% were male and 15.7% were female. With number of local growers and livestock farmers, women have also very low number compared to men. However in Kiribati, most women are household gardeners growing mainly for household consumption. In the Agriculture and Livestock Division's workforce, there were 70 staffs of which 49 were men and 21 were female. Women are usually high position holders in the Division with most men at the technical and lower level positions.

The public sector is the major contributor to the economy of Kiribati providing two-thirds of all formal sector employment and accounting for almost 50% of gross domestic product. Marine resources, copra, and fish are primary components of the economy. Agriculture is still predominantly subsistence due to the limited natural resource base and infertile soils of atoll islands. Coconut trees are the sole cash crop through copra production which is widely practiced throughout Kiribati. Copra and crude coconut oil were two of the top five exports from Kiribati in 2013 with values of US\$833 million and US\$2256 million respectively.

The maritime and fisheries sector primarily comprised the bulk of the economy through fishing license and access agreements for I-Kiribati crews to work in foreign vessels. These two sectors provide strong

employment and income opportunities. The Kiribati Fish Limited (KFL) is the first ever local fish processing company. KFL employs local fishermen to participate in tuna fishing for its supply. Seaweed is also one of Kiribati fisheries exports and is the national largest and longest running aquaculture product. The other common fishery export is sea cucumber.

Rapid economic growth of Kiribati is always constrained by Kiribati’s small size, limited natural resources, geographic isolation and island fragmentation. Despite the low economic prospect of Kiribati, the country is blessed with a vast ocean territory and rich marine biodiversity resources to provide the people of Kiribati with their main source of protein and income. Terrestrial biodiversity resources on the other hand are very poor due to the natural endowments of atoll islands which include small land size, limited fresh water resources, fragile environment, and poor or low soil fertility. Such restrictive and unique conditions provide a relatively harsh and unfriendly environment for supporting diverse terrestrial life or organisms, thus the land-based flora and fauna is poor. No endemic species exist and the main indigenous terrestrial fauna include birds, insects and land crabs.

Marine and terrestrial biodiversity provides resources and services which are directly and indirectly contribute to a sustainable food security and livelihood of the I-Kiribati, maintaining and promoting cultural identity, and improving socio-economic well-being. With a focus on biodiversity for food and agriculture, there are three significant components which play vital role to improving and sustaining food security and nutrition. The three components namely associated biodiversity, ecosystem services, and wild foods are continually protected and managed through on-going and new national and local initiatives and programs on protected and conservation areas, *ex situ* and *in situ* conservation of high threat but high value species of animal and plant food sources, habitat restoration and rehabilitation. The government continues its support to such programs and initiatives (see section 3.1) due to the recognized invaluable role of biodiversity for food and agriculture to provide and maintain production systems of food (animal and plant source as well as land and aquatic food sources), to regulate and balance components of agroecosystem and coastal zone marine habitat for maintaining the function of beneficial species (those which are essential for maintaining good quality of water, pollination of plants, good health of soil and corals, presence of trophic food sources, etc..).

Table 1 Production systems present in Kiribati.

Production system	Indicate if present in the country (Y/N)	Description ¹³
Planted forests	Y	Area under production: 22,436 Ha (coconut) Share of smallholders: Over 50% Importance of the production system to the income: Very high Livelihoods and well-being of rural communities: Highly dependent Levels of agricultural intensification and reliance upon synthetic inputs, modern varieties, fossil fuels, etc.. – Very low

Self-recruiting capture fisheries	Y	Some milkfish? Wild capture trade of 'pet fish'.
Culture-based fisheries	Y	Area under production: 830ha Share of smallholders: 100ha Importance of the production system to the income: income for milkfish farmers Livelihoods and well-being of rural communities: Enhanced through fish farming
Fed aquaculture	Y	Giant clams are harvested from the wild for food and farmed from imported spat for food
Non-fed aquaculture	Y	Sea cucumber is one of Kiribati's major export earnings next to seaweed and coconut-based copra. It is harvested and dried out to produce bêche-de-mer or trepang, a popular product in Chinese markets. There are around a dozen species in Kiribati, most of which are of medium to low economic value. Two species, the black teatfish (<i>H. nobilis</i>) and the white teatfish (<i>H. fuscogilva</i>) are of high value. Another high-value species, the sandfish (<i>H. scabra</i>) does not occur naturally in Kiribati and has been introduced. The bêche-de-mer fishery has expanded considerably in recent years and is under significant pressure from overfishing with some fisheries effectively 'fished out'. A wild stock enhancement hatchery has been established in Tarawa, but this has yet to be proven effective.
Mixed systems (livestock, crop, forest and/or aquatic and fisheries)	Y	Traditional system in Kiribati

1.2. State, trends and drivers of change of biodiversity for food and agriculture

(a) Kiribati biodiversity ranges from very rich as in the case of marine resources to very poor as in the case of terrestrial resources. The rich marine fauna biodiversity includes between 300 and 400 finfish species. The marine flora comprises mainly of microalgae, algae and seaweeds species. Non-fish species include a wide range of crustaceans, bivalves gastropods, and holothurians or beche-de-mer. Species of note include Green (*Chelonia mydas*), Hawksbill (*Eretmochelys imbricata*), Loggerhead (*Caretta caretta*), Olive Ridley (*Lepidochelys olivacea*) and Leatherback (*Dermochelys coriacea*) turtles.

There are 20 marine mammal species. Kiribati has extensive coral reefs, although specific figures do not exist quantifying the precise coverage and status. There are at least 350 species of coral in Kiribati. The Government considers most coral habitats to be in excellent condition. Kiribati's outer island atolls and reefs spread throughout the EEZ are critical to the maintenance of the entire region's marine fisheries resources. Kiribati is part of the Polynesia-Micronesia Biodiversity Hotspot, one of 34 such global hotspots. The extremely isolated nation is fortunate to be the bastion for some of the world's most significant coastal and marine biodiversity. There are hundreds of marine species. Marine fauna includes between

Land-based aquatic biodiversity is primarily comprised of cultured aquatic species such as milkfish, tilapia, and microorganisms and algae living in natural and man-made pond ecosystems. With terrestrial, floral diversity there is no more than 300 species which includes both indigenous and exotic plant species. None are endemic. Plant species which are relevant to food and agriculture consist of no more than 60 species which include food plant and non-food plant species used in agriculture and food production. Diversity of food crops, both introduced and traditional for climate resilience, varies between the island groups of Kiribati. The variation is largely dependent on the distinct growing conditions between the islands. The Northern Group islands receive high rainfall and thus have rich organic matter levels in the soil to support a wide range of food crops. The islands in this region have high productivity and diversity of water-loving or water-sensitive crops such as banana and species of edible aroids such as *Cyrtosperma*, *Alocasia*, *Xanthosoma*, and *Colocasia* as well as with water-insensitive crops such as breadfruit, cassava, and sweet potato. This is also the same as in the Line group islands such as Tabuaeran and Teraina

Terrestrial fauna includes birds, insects and some land crabs and no mammals. Sea birds in their millions occupy uninhabited islets and/or atolls of the Line and Phoenix groups. Raised animal food species include pigs, chickens, and to a lesser extent ducks and dogs. Birds and land crabs are wild food species and they are varied in their abundance or existence across the islands of Kiribati. In Kiritimati Island, land crabs are raised by families when they want to have good yields or good meat crabs for their use. In raising crabs, they collect wild land crabs and keep them in a confined area of few square meters area which is filled by coconut fronds and are fed regularly.

The state of biodiversity for food and agriculture as revealed in several national reports¹ is in a significant state of degradation. With terrestrial biodiversity, island surveys and community appraisal studies on the islands' biodiversity reported a declining trend in the sub-species of important traditional food plants which are breadfruit, pandanus, giant swamp taro, native fig, and coconut. Results from the National Census report 2005 and 2010 also showed that the abundance of these traditional staple food crops including native fig, were reducing in trends. Similarly for aquatic biodiversity, important food species such as ark shell, bone fish, giant clam, lobster and all species of shark were reported to be declining in density, distribution, and size ratios. However the overall diversity of food crops is enhanced through the importation of new varieties of exotic staple food crops such as sweet potato, cassava, taro,

¹Kiribati National Biodiversity Strategy and Action Plans, 2005; Kiribati 4th and 5th National Reports to Convention of Biological Diversity

yams, and banana from the Secretariat of the Pacific Community Center of Pacific Crops and Trees (SPC CePaCT) as part of regional collaborative initiatives in enhancing food and nutrition security. With terrestrial aquatic genetic resources, there are species of sea cucumber such as sandfish which were introduced recently through ACIAR Community-based Aquaculture project with the Ministry of Fisheries and Marine Resources Development.

The change (POSITIVE AND NEGATIVE) of biodiversity in Kiribati is primarily driven by:

- The population change - population growth drives changes in land and water use and management as well as natural resources use. With an increasing population, land is required for infrastructure development, settlement and commercial purposes, such as wharfs etc. High rural urban drift is another element of population change which changes biodiversity due to the abandonment of local food traditions and adoption of western food traditions. Local food traditions help to maintain traditional crop varieties in the agricultural production system.
- Policies - Kiribati government has PIPA (Phoenix Island Protected Areas) Regulation 2008 which supports the protection and conservation of pristine environment and resources in the Phoenix Islands from over exploitation and commercial uses. Sharks, birds, land crabs, tuna are some of the species protected in this regulation. Eradication of mammalian invasive species (rats and rabbits) is also part of this project. PIPA regulation 2008 is developed in compliance or as part of the Kiribati government's obligation to the CBD.
- Climate change - Increasing sea level rise leading to high coastal erosion has an impact on coastal species that use beaches for nesting such as turtles. In Kiribati, the acidification of ocean has been observed as increasing since the 18th century and is projected to continue to increase. Increase of ocean acidification will lead to a reduction of aragonite saturation of seawater (KJIP, 2013). The lower the aragonite saturation of seawater, the harder it will be for coral reef to grow and develop a healthy ecosystem.
 - El Niño is generally associated with above-normal rainfall. In Kiritimati, 1950 – 2009 observations show that the annual and wet season rainfall has increased, causing high disturbance to bird population especially during breeding season. During the La Nina, most of the months in a year receive low amount of rainfall often less than 750mm for the annual rainfall. Very dry conditions affect growth and production of trees and plants that are used as food and nesting sites for birds and other wild species.
 - Natural disasters. Tropical storms/cyclone Pam, king tides, and overtopping of waves are major disasters that have caused massive destruction of coastal species and coastal vegetation stands.
- Introduction of plants and animals change biodiversity through introduction of new species which can be destructive to island biodiversity such as in the case of rats and rabbit introduction to the Phoenix island group. In the Phoenix Islands, rat and rabbits eat bird eggs in the wild and thus causing reduction in the population of birds.
- Changing economic, sociopolitical, and cultural factors - due to change in economic activity, most of the marine resources are over exploited. Also, a change in cultural factors such as change of gender roles in families where women are increasingly engaged with official tasks

reducing the time spent in household and family farm activities which can have a negative impact on the sustainable use and conservation of biodiversity resources.

(b) **Kiribati does not have a national information system in place for associated biodiversity.** Data and information of marine and terrestrial biodiversity are primarily based on interviews, observation, and expert's view. The scientific and comprehensive biodiversity assessment and monitoring are often lacking at the country level. There is a big gap on data and information used in biodiversity assessment with most of the information sourced from early studies and surveys. Updating and validating data on state of biodiversity is a priority need. In addition, a national centralized information system is required to improve storage and management of data, as well as supporting the updating, validating and dissemination or use of data on biodiversity for food and agriculture.

(c) **Table 2 List of associated biodiversity species that are actively managed in production systems for the provision of ecosystem services.**

Associated biodiversity species	Ecosystem functions and services provided by the species in the production system
Mangrove	Shelter for small fishes, wind break, and coastal protection in coastal zone marine habitat
Sea cucumber	Detritus feeders and cleanse muddy sediments and recycle nutrients and sediments
Wild birds	Bird droppings (guano) enrich soil
Ark shell	Symbiotic relationship with sea grasses and filter feeders
Glyricidia	Fix soil nitrogen
Algae	Produce food and oxygen for other organisms in the aquatic ecosystem
Corals	Habitat for diverse aquatic species

(d) **Table 3 Wild food species used for food in the country and the change in state of the species over the last 10 years**

Wild food species	Change in state (2,1,0,-1,-2, NK)
Bird	Not consumed (-2)
Land crab	-1
finfish	-1
Shell fish	-2
Turtle	Subsistence use (-2)
Tilapia fish	0
Clamps	-2
Native fig	-1
Breadfruit	-1
Sharks	Banned (-2)
Whales	-2
Giant swamp taro	-1
Eel	-1
Sea vermicelli	-1

(e) In Kiribati, the proportion of the population that uses wild food on a regular basis for food and nutrition varies between the three island groups and between wild food species. With the three island groups (Gilbert, Phoenix, and Line) and during normal times, finfish accounts for 76% of the proportion of the population that uses fish in their diet. And based on diet, it accounts for 50% of the diet of all families. The other 50% is for starch and hardly any share of vegetables in the Kiribati families' diet. In the outer islands, the fish used are predominantly caught or captured by household members while in capital or urban centers, fish used are predominantly deep sea fish purchased from markets.

By island group, Gilbert Islands have higher proportion of population that uses coastal and marine wild food sources mainly fish, clamps, and shell fish during normal times. However, different regions or districts of the Gilbert Islands also differ in the extent to which the population uses wild food. For example, in the Northern islands 50-60% of the population consumes land crabs on a regular basis. In the central and southern islands, land crabs are less abundant therefore an estimated 10-20% of the population consumes land crabs on a regular basis. With the Phoenix and Line groups, a high proportion of population use land crab and bird species on a regular basis. The existence of wilderness, marshy, natural ponds, and abundance of small uninhabited islets in northern islands of the Gilbert group and in the Line and Phoenix islands, are thought to contribute to the high stock of wild bird and land crab species. In these islands, the proportion of wild food in the diet can reach up to 100% but not on a regular basis. Giant swamp taro and breadfruit are the two common staple wild food sources that are highly used by the large proportion of the population throughout Kiribati, but not on a regular basis. In times of emergencies or shortage of imported foods, mainly rice, the two will be highly used by larger proportion of the population.

In Kiribati, the degree to which wild foods are used varies with the type of food and species. Fish is a subsistence food and that means fish is consumed every day by the population. In between fish the land crab, shell fish, eel, clamps, and shark are consumed but with lower proportion of the population and more or less on a regular basis especially by the rural population. Birds, turtles, and whales are wild food sources that are rarely consumed. They are only used in cases of craving pregnant mothers and sick people's diets.

f) Briefly summarize the state and trends of and the drivers of change affecting associated biodiversity etc.

From national reports of biodiversity to the CBD, the state of Kiribati biodiversity is reported as threatened, particularly with a number of marine and terrestrial food resources. The fact that most assessments results reported are food-based and are not scientific or field-based assessments, states of associated biodiversity and ecosystem services are fairly unknown, especially with diversity of microorganisms and other species or living creatures that are indirectly involved in the production of foods such as bees, algae, to name a few. Wild food resources on the other hand are well reported

because several significant wild food species are regulated and protected under a number of national and regional conservation and protected areas projects and initiatives.

The declining trend of most of Kiribati wild food resources is reported as associated with either natural or human induced drivers of change. The most noticeable driver affecting wild food resources is population pressure either from increased urbanization or general high growth rates. Urban centres such as Tarawa and Kiritimati have high proportion of the population and this leads to over-exploitation or over-harvesting of some wild food species commonly used in these islands such as lobster, shell fish, bonefish, and so forth. Wild food species are easily accessible to the public, making them easy targets for unsustainable exploitation and utilization and vulnerable to the issue of ‘tragedy of the commons’. In Kiribati, tragedy of the commons issue is a major concern of the fisheries sector.

Population pressure on biodiversity resources is exacerbated by the change of lifestyle and economic activity by the population. Nowadays, people are inclined towards monetary-based lifestyles which encourages excessive harvesting of biodiversity resources for selling rather than for subsistence living. Species groups of clam, bêche-de-mer, and lobster have undergone overexploitation and are reported to have declined in Abaiang and Kiritimati. Other marine species reported to be overharvested for small scale commercial and subsistence purposes are mainly ark shell, locally known as ‘te bun’ and reef fish species (PROC Fish Kiribati Country Report, 2004).

Land and marine use changes affect associated biodiversity, wild food sources, and ecosystem services. Major recent land and marine use changes include heavy construction of road, wharf, causeways, and channels, airport rehabilitations and expansions, conversion of lands into private and commercial buildings, land reclamation. Such activities caused mangrove forest destruction – Tarawa has lost 150 hectares of mangroves since the 1940s

BOX 1. Describe one or two examples of countermeasures that have been taken in the country to reduce adverse effects of drivers on associated biodiversity, ecosystem services and/or wild foods.

Box 1: Mangrove planting

In Kiribati there are three major projects that support the mangroves replanting. Kiribati ratified the RAMSAR Convention on the 3rd August 2013. Nooto – North Tarawa has been designated as a RAMSAR site for Kiribati. The implementation of the RAMSAR activity in Nooto has focused on mangrove replanting, awareness and part of that activity has introduced coastal cleanup.

1.3 Needs and priorities

In Kiribati, there is a serious lack of monitoring activities related to associated biodiversity. However, in the Phoenix Island group a collaborative conservation initiative of the Phoenix Island Protected Areas by the Government of Kiribati and its international partners such as New England Aquarium, has a number of well monitored programmes and activities of bird species such as phoenix petrel and white throated storm petrel, coral, crabs, sharks, tuna, plankton, and other endangered species of Kiribati. The need to cover the whole Kiribati islands in these monitoring activities is a priority of the government however due to lack of financial and technical resources, this has been slowly progressed.

Biodiversity component	Gaps/limitations/constraints	Recommended actions	Priority area
Ecosystem services and associated biodiversity	Lack of information and knowledge on the current state, trends of associated biodiversity and ecosystem services Fragmentation of biodiversity related information and data Lack of information on the economics valuation of ecosystem and biodiversity	Conduct baseline data collection of the diversity of components/elements of associated biodiversity such as diversity of plants, animals (land and aquatic), soil biodiversity, etc Aggregating established or published relevant and related data and information on associated biodiversity and ecosystem services at the local/island and national/country level	Biodiversity information and knowledge system (HIGH PRIORITY)
	Lack of technical capacity on species identification and morphological characterization (taxonomic skills) Lack of capacity and resources on effective data and information collection technologies/methods	Provide capacity building through engagement of technical assistant or short term training on key identification skills, field sampling, and preservation techniques Provide training on effective biodiversity data and information collection and analysis methodologies and technologies	Taxonomic skills, key identification, field sampling, and preservation techniques (HIGH PRIORITY) Biodiversity data and information collection technologies (PRIORITY)
	Poor centralization and well monitored system of data and information on biodiversity Ineffectiveness and weak enforcement of biodiversity related policies	Key sectors of biodiversity (fisheries, agriculture, forestry, livestock, environment, water, Phoenix Islands Protected Area project) to start collecting datasets relevant to biodiversity Identify the key sector who will keep all the datasets and provide backup	Collaboration, synergy, institutional arrangement of biodiversity in the government's ministries (HIGH PRIORITY)

		<p>Establish a Scientific Advisory Group/Committee with an endorsed mandate to carry out scientific assessment and monitoring of Kiribati's biodiversity through national and regional collaborative initiative</p> <p>Incorporate biodiversity data and information collection and monitoring into key sector's strategic plan</p> <p>Procuring equipment and technical assistance for establishing a centralized biodiversity information and data</p>	
Wild food resources	Lack of information and knowledge on the state, trends of wild food resources	<p>Establishing an official national baseline data and information on the state of wild food resources which would identify which ones are threatened, endangered, rare, extinct, cultivated, abandoned, underutilized, and so forth</p> <p>Data collection especially on assessing and monitoring the production and consumption trends of wild food resources at the household, island, and country level</p>	Information and data monitoring system
	<p>Lack of capacity in data analysis of survey findings</p> <p>Low technological resources to monitor movements of migratory wild fish food species in the entire Kiribati EEZ</p> <p>Absence of technological resources and human capacity at rich-resourced islands, in areas of regular</p>	<p>Provide training on data analysis on fisheries, livestock, agriculture, and forestry field studies/surveys and socioeconomic surveys</p> <p>Provide support on technological resources and human capacity to stocking and restoration</p> <p>Increase collaborative initiative programmes with international and regional partners on monitoring wild food resources</p> <p>Strengthening collaboration and partnership with PIPA project</p>	Technical capacity in data analysis, technical resources on monitoring, stocking, and restoration of non-regulated or non-protected wild food species

	stocking and restoration of wild fish food species	Increase engagement of local staffs and Kiribati students in PIPA research and expedition programmes	
	Weak surveillance and enforcement of maritime law Lack of community based protection and conservation initiatives and programmes on wild food resources	Strengthen institutional collaboration to support surveillance and enforcement of national conserved and protected areas Development of policy on wild food resources conservation incentive funds Revised or amend environment act and integrated environment policy to strengthen the element of conservation of wild food resources	Kiribati EEZ Surveillance and enforcement assessment Wild food resources conservation incentive funds policy Revised environmental act and Kiribati Integrated Environmental Policy

2.0 Sustainable use and conservation of biodiversity for food and agriculture

2.1 Sustainable use

Table 4 Management and diversity based practices that support the maintenance and use of biodiversity for food and agriculture in production systems.

Production system	Management/ diversity based practice ²	Trends in the application of the practice over the past ten years
Planted forests	Ecosystem-based Adaptation Management, agroforestry, diversification, base broadening, maintenance or conservation of landscape complexity, restoration practices, enriched forests	New management practice Increasing Increasing Increasing decreasing Decreasing Decreasing
Self-recruiting capture fisheries	Ecosystem approach to fisheries management (EAFM), Ecosystem approach to coastal fisheries management (EAFCM), Ecosystem approach to capture fisheries, community-based fisheries management, coastal zone fisheries conservation practices, conservation hatcheries, diversification, restoration practices, management of micro-organisms	Increasing
Culture-based fisheries	Ecosystem approach to aquaculture management (EAAM), Ecosystem-based adaptation management/ecosystem approach in capture fisheries, community-based fisheries management, coastal zone fisheries conservation practices, diversification, restoration practices,	Increasing
Fed aquaculture	Ecosystem-approach to aquaculture fisheries, Conservation hatcheries, management of microorganisms, diversification, landscape management, integrated multi trophic aquaculture (IMTA)	Increasing
Non-fed aquaculture	Conservation hatcheries, management of microorganisms, landscape management, diversification, hatchery culture of invertebrates, culture of phytoplankton and zooplankton	Increasing
Mixed systems (livestock, crop, forest and/or aquatic)	Integrated plant nutrient management, integrated pest management,	Decreasing Decreasing

² Reference: questions 52, 53 and 56 of country report guidelines.

and fisheries)	diversification, base broadening,	Increasing Increasing
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Box 2: Describe a successful programme or project that has been undertaken in the country to support one of the practices listed in Table 4.

Box 2

Live & Learn programme: this programme aims to strengthen community-based farming. Working with the Agriculture and Livestock Division and the Taiwan Technical Mission seedling and planting materials are distributed to support diversification of community and home gardens.

Kiribati organic production - for example, the Kiribati Organic Producers (KOP) is a social business enterprise selling organic coconut products such as virgin coconut oil (for cooking, cosmetics and medicine), coconut sap sugar and coconut syrup.

Also the GEF-UNDP Targeted Portfolio Project on Capacity Building and Mainstreaming of Sustainable Land Management (SLM) for Least Developed Countries (LDCs) and Small Island Developing States (SIDS): The agro-forestry demonstration project was implemented on nine islands from the Gilbert group in 2010 as a community-based activity, with both men and women participants from different villages. Various legumes including tomato, cucumber, and cabbage were planted because of their nutritious qualities for consumption, and also because they improve soil quality composition. Composting was also introduced to complement soil enrichment practices. Nitrogen fixing trees were planted on the perimeter of the crop area to improve long-term survivability. This project incorporated inventories of existing plants on islands to gain information about native varieties. Awareness building was also a part of the process, to ensure that agricultural tools were being used appropriately among villagers. The events proved to be educational for the communities but also for the SLM team. One good example was the fact that the communities did not immediately understand that the legumes were consumable, and as such were allowing them to enrich the soil and then uprooting and throwing them away. Remedial training and awareness-building was conducted to counter this practice and the SLM team now has a better understanding of the knowledge gaps to be addressed.

- a) Provide examples whereby the diversity *per se*, or its lack, had a direct effect on productivity; food security and nutrition; rural livelihoods; ecosystem services; sustainability; resilience; or sustainable intensification.
 - Breadfruit production in Butaritari Island where only one variety of breadfruit (bukiraro variety) is commonly and widely grown. Breadfruit is a main staple food in this island. In 2002, an

infestation of anthracnose disease caused approximately 70% loss of yield of breadfruit due to high vulnerability of this common variety to fruit rot/anthracnose. Rural livelihoods, food security, resilience and productivity of breadfruit trees, were all directly impacted by this disease outbreak at this island.

- Marine and terrestrial diversity is very rich or high in the Phoenix Islands due to the protected area initiative in the Phoenix island group. Diversity includes new crab species “PIPA rubble crab” within the *Liocarpilodes armiger* species complex, snappers trophically differentiated by species, sharks trophically differentiated by species and in some cases, by island - 3 populations of black-tip reef sharks were all discovered in this island group. Also sperm of whales and eggs and larvae of tuna were found in this area. This diversity directly influences the productivity and sustainability of fishery resources, enhancing resilience and ecosystem services of Phoenix islands and food security of Kiribati people through consumption of migratory species such as tuna (main deep sea fish species consumed by Kiribati people)
- Monocropping and repeated cropping of a single leafy vegetable – Chinese cabbage, by most vegetable farmers on South Tarawa has directly impacted the productivity of soil, sustainability of vegetable marketing and decline in agroecosystem services.
- Integrated farming of milkfish, sandfish sea cucumber and seaweed where milkfish is farmed to provide food for local populace during abnormal weather patterns when fishing cannot be carried out due to bad weather; while seaweed is farmed as a means of earning income along with sandfish sea cucumber. Fortunately sea cucumber is not eaten by the locals but only processed and export to consumers in Asia.
- Another classic example is the operation of a Eco Farm where chicken are raised for egg production while chicken manure is used to fertilize milkfish ponds where milkfish are grown and sold to the locals for food and for bait for catching reef fishes.

b) List in Table 5 examples whereby the use of biodiversity for food and agriculture contributed to cope with climate change, invasive alien species, and natural or human-made disasters

Table 5 Examples whereby the use of biodiversity for food and agriculture (BFA) contributed to cope with climate change, invasive alien species, and natural or human-made disasters

Objective	Description
Use of BFA to adapt to and mitigate climate change	Mangrove planting at coastal areas, base broadening of marine species through introduction of resistant species of sea cucumber that can cope with high temperature conditions, base broadening and diversification as through introduction of climate and disaster resilient varieties of food crops such as drought tolerant variety of sweet potato and dwarf variety of banana.
Use of BFA to manage the spread of/control invasive alien species	Introduction and mass rearing of beneficial fungus <i>Metarhizium anisopliae</i> to control invasive taro beetle in babai. Not successful in Kiribati. Use of introduced tilapia to control the spread of induced diseases caused by mosquitoes i.e. tilapia to feed on mosquito larvae thereby controlling spread of mosquito related diseases
Use of BFA to prevent natural or human-made disasters and/or reduce their effects on livelihoods, food security and nutrition	Mangrove planting - mangroves grown in around eroded seafront and tidal flats to reduce erosion and seawater infusions onto onshore areas.

d) List and briefly describe ecosystem/landscape/seascape approaches that have improved the management and use of biodiversity for food and agriculture in the country.

GEF-funded Ridge-to-Reef project 'Kiribati Resilient Islands, Resilient Communities aims to:

- Improve the sustainability of Protected Area Systems
- Reduce pressure on natural resources from competing land uses in the wider landscape
- Reduce pressure on forest resources and generate sustainable flows of forest ecosystem services

Kiribati has established the massive Phoenix Island Protected Area (PIPA). This is an outstanding conservation achievement. The Phoenix Island Protected Area (PIPA) covers 408,250 km². Kiribati declared PIPA at the 2006 Conference of the Parties to the Convention on Biological Diversity in Brazil. Kiribati adopted formal regulations for PIPA in 2008 and more than doubled the original size. PIPA became a UNESCO World Heritage site in 2010. PIPA includes the entire Kiribati section of the Phoenix Island group. This area consists of eight atolls and islands: Rawaki, Enderbury, Nikumaroro, McKean, Manra, Birnie, Kanton and Orona. PIPA includes two submerged reefs: Carondelet and Winslow Reef. There are an estimated 30 seamounts within PIPA. The remainder of PIPA is comprised of ocean floor. The water column averages more than 4,000 m deep with a maximum depth of 6,147 m. PIPA is closed to commercial fishing. While regulation and enforcement remain challenging, the government has established a trust fund for managing the area. Closing PIPA to commercial fishing provides an opportunity for the regeneration of tuna in and around Kiribati's waters.

In 2009 the government of Kiribati first proposed 'A Framework for a Pacific Oceanscape' that was later conceptually approved by leaders at the Pacific Islands Forum in 2010. This is a collaborative agreement between 15 Pacific Island nations for the integrated management of 38.5 million km² surrounding their collective islands, or four times the size of continental Europe. The agreement covers ocean health and security; governance; sustainable resource management; increased research and knowledge investment; and facilitating the partnerships and cooperation needed to support the conservation of these vast and essential ecosystems. The Pacific Islands Forum Secretary General Tuiloma Neroni Slade is to be the first Pacific Oceanscape Commissioner. His role is to be the united voice for the Pacific Ocean and to help the region prepare for the United Nation's Rio + 20 and other international meetings.

(e) Provide examples of activities undertaken to maintain and use traditional knowledge of associated biodiversity and wild foods.

Using culture to understand the link between gender and energy:³ At a Community based workshop on gender, climate change and energy, it was interesting to note how the participants used their culture to understand the link between gender and energy. A representative from the youth group (female) discussed the use of an energy source, firewood from the pandanus tree, to preserve their dancing skirts for a cultural performance: 'With limited firewood on Tarawa, the traditional knowledge on the preservation of dancing costumes will also be dying out.' SPC is working with

³ http://gendercc.net/fileadmin/inhalte/dokumente/6_UNFCCC/Gender_and_Social_Dimensions-Kiribati_Case_Study_01.pdf

Kiribati in promoting the use of efficient stoves women and girls are less exposed to smoke that can cause health problems. Also it will save them more time which they can use for other economic activity (weaving of mats and handicraft products). The pandanus trees are also a food (fruit) and herbal medicine for the Kiribati people, by replanting these trees it also provide secure source of their traditional food and herbal medicine.

Milkfish is traditionally cultured in brackish water fish ponds that are either manmade or naturally occurring. The milkfish fry or fingerlings are caught from the wild during new and full moon phases using coconut leaves and plant branches. They are then acclimatized by introducing them into brackish water fish ponds using pandanus leaves as a means of guiding them into ponds. These milkfish feed on brown, green or red algae that naturally grow in such brackish water ponds. After three to four months, they are harvested as food during big festivals organized on the islands.

(f) Identify possible needs and priorities in terms of the sustainable use of biodiversity for food and agriculture, and in particular of associated biodiversity and wild foods.

- National policies and strategies in place to support sustainable use of BFA – especially for agriculture and fisheries with improved monitoring of BFA impact in production to assist with development of evidence-based policies.
- Certification systems, such as organic certification, that encourage sustainable practices in production systems - market creation for products or services provided by ecological agriculture may be important in ensuring long-term adoption of sustainable practices, substituting public financial support after an initial phase.
- Increased awareness and education for all stakeholders including decision-makers, researchers, producers and consumers is needed to highlight the multi-functionality of agriculture and the interconnectedness of biodiversity, ecosystem functioning and human health.
- Use of traditional knowledge supporting the sustainable use of BFA and improved documentation and sharing of this knowledge within and between countries

2.2. Conservation

a) Describe the status of *in situ* conservation of associated biodiversity and wild food species in your country:

1. List and describe any existing national *in situ* conservation initiative(s).

- Phoenix Island Protected Area. A national initiative supported by international partners aimed at conserving marine and terrestrial rich diversity of the Phoenix Islands. It was recently included as one of the World Heritage Sites. Wild bird, sharks, crab, tuna, corals, and other marine and terrestrial species are protected and conserved. At the same time this area serves as a genebank for restocking of fish that are declining and threatened in the Gilbert island group.

2. Indicate which species/groups of species are being conserved and with what objective(s).

- Breadfruit, Pandanus and babai are conserved for food security and nutrition objectives

- Bone fish is conserved for eco-tourism (game/sport fishing by tourists)
- Sharks are conserved for cultural values and for restoration
- Turtle conserved for restoration of populations
- Ark shell for restoration and food security
- Sea cucumber for restoration and economic activities

3. Describe any existing sub-regional/regional *in situ* conservation initiative(s) the country is involved in.

The Framework for Nature Conservation and Protected Areas in the Pacific Islands region, 2014-2020 will provide guidance for the region on key priorities for biodiversity conservation and ecosystem management with clear linkages to NBSAPs and the Aichi Biodiversity targets. Strategic goal C is 'to improve the status of biodiversity by safeguarding ecosystems, species and diversity

b) Describe the status of *ex situ* conservation of associated biodiversity and wild food species in your country:

1. List and describe any existing national *ex situ* conservation initiative(s).

- Pandanus, breadfruit and coconut field genebank (the genebank is currently converted now to vegetable farm by Taiwan Technical Mission)
- Babai (swamp taro) genetic resources field genebank at Abaiang Island. Rare and threatened varieties of babai were conserved in this genebank.

2. Indicate which species/groups of species are being conserved and with what objective(s).

- Pandanus, breadfruit, coconut, and pandanus for food security and livelihoods
- Giant swamp taro and pandanus for climate resilient traits conservation, food security and nutrition.
- Village field genebank. Village genebanks at 2 selected islands for traditional food crops which are breadfruit, pandanus, coconut

3. Describe any existing subregional/regional *ex situ* conservation initiative(s) the country is involved in.

Kiribati, as a Secretariat of the Pacific Community (SPC) and University of the South Pacific (USP) member country can participate in *ex situ* conservation through SPC and USP. In 2011, the SPC developed the Pacific Islands Tree Seed Centre (PITSC) to help research, conserve and disseminate seeds of socio-economically important tree species for its 22 member countries and territories, including Nauru.

In April 2014 the RBG, Kew and SPC signed a 10-year agreement to work together in supporting and implementing plant conservation activities in the Pacific region, specifically with the PITSC. The vision of the Regional Strategy and Action Plan on Forest Genetic Resources Conservation and Management is: by 2020, the Pacific Island Countries and Territories are enjoying improved livelihoods, greater food security and increased environmental protection, resulting from enhanced collaboration and coordination within and between them in the conservation, management and sustainable utilization of forest genetic resources, while maintaining their unique Pacific cultures

The SPC Centre for Pacific Crops and Trees can support SPC member countries in conserving agricultural biodiversity. Pandanus and giant swamp taro from Kiribati are conserved at the SPC Centre for Pacific Crops and Trees (CePaCT).

The Fiji Herbarium at the University of the South Pacific houses more than 50,000 vascular plant specimens in the main collection. It also has a wet collection of plant parts, bryophytes and algae from the Pacific region. The Herbarium serves as a very important resource in matters pertaining to the taxonomy, conservation and ecology of plants, forestry, land use planning, economic plants and weed problems in the region.

c) Identify possible needs and priorities in terms of the conservation of biodiversity for food and agriculture, and in particular of associated biodiversity and wild food species.

- Close coordination and collaboration between agriculture and the environment to ensure that any planned expansion in agriculture does not impact negatively on sensitive habitats – cross-sectoral collaboration
- Improved monitoring and data gathering is needed including mapping data to enable future assessment of the environmental impacts of agriculture on the environment.
- Increased awareness and education for all stakeholders including decision-makers, researchers, producers and consumers is needed to highlight the multi-functionality of agriculture and the interconnectedness of biodiversity, ecosystem functioning and human health.
- Capacity building and supplementing is needed either at the national, sub-regional or regional level to support both development of conservation strategies, including prioritization and development of technologies.
- Build capacity of communities to become informed partners in land use planning. More active participation by communities in land use planning will lay a foundation for states to develop and implement land use plans, which will set the stage for conservation of BFA.
- Increased use of ridge-to-reef, landscape and ecosystem approaches
 - Assessment of existing policies for conservation of BFA

2.3 Access and Exchange

Describe in Table 6 the main measures in the country (i) regulating access to; and (ii) ensuring the fair and equitable sharing of benefits arising from the utilization of biodiversity for food and agriculture.

Components of BFA	Description of measures governing access to BFA	Description of measures regulating the fair and equitable sharing of benefits arising from the utilization of BFA
<i>Genetic resources</i>		
PGRFA	Kiribati ratified the ITPGRFA so ABS is through the IT MLS	
AnGR	Kiribati has not signed/ratified the Nagoya protocol or signed the MTA	

FGR	with SPC for FGR	
AqGR		
<i>Associated biodiversity</i>		
Micro-organisms	Any research into marine organisms would likely be in collaboration with USP which is the regional agency with expertise in this area.	
Invertebrates		
Vertebrates		
Plants		
Wild foods		

b) Possible needs and priorities in terms of the policies and regulations governing the access to and ensuring the fair and equitable sharing of benefits arising from the utilization of BFA, and in particular, associated biodiversity.

- Improved awareness and capacity building to support accession to the Nagoya Protocol
- There is a need to localize the provisions of CBD and ITPGRFA in national policies and plans supported with suitable legal framework to address local farmers’ access, exchange and sharing of genetic resources and its use and management, farmer rights, IP etc.

3.0 Policies, institutions and capacity

3.1 Policies, programmes, institutions and other stakeholders

Policies and Plans/programmes that Kiribati adopt and about to adopt, which support the sustainable use and conservation of BFA

1. Kiribati Integrated Environment Policy (KIEP) – Highly relevant, especially with the conservation of biodiversity (aquatic and terrestrial) at the national and local levels.
2. Kiribati Joint Implementation Plan 2014 – 2023 – Highly relevant. Strategy 4 is for the food security enhancement and productive and healthy of ecosystem at the national, sector, and community levels
3. Kiribati National Fisheries Policy 2013-2023 – Highly relevant, focusing on fisheries and marine resources conservation, protection, and sustainable use at the national and local levels.
4. Agriculture Strategic Plan 2013 – 2016 – Highly relevant, focusing on terrestrial diversity which includes crop diversity improvement and conservation, sustainable soil management practices, and livestock diversity improvement.
5. Kiribati Cultural Policy – Medium relevant. Focus on conserving high cultural value sites or islands which might be at the land and coastal areas and these sites/areas contain wild food species and ecosystems that are important for food and agriculture.
6. Island Council Strategic plans (Kiritimati and Abaiang Island) – Highly relevant. The SP has sectoral inputs from Environment, Fisheries and Agriculture which aim to support sustainable use and conservation of biodiversity at the local level.

a) Provide a short analysis of the strengths and weaknesses of the policies and programmes mentioned above and indicate their level of implementation.

Major strengths: they are comprehensive policies and plans with clear implementing plans – also useful for raising awareness and help in securing external funding and developing project proposals.

Major weaknesses are reporting, monitoring and evaluation, finance and technical support and poor institutional arrangement.

Level of implementation: sectoral policies and plans are well implemented while the national policies and plans are quite slowly progressed with their implementation due to weak coordination mechanism and also funding supports to implement activities

BOX 3. Provide up to three examples to highlight how stakeholder groups in the country, such as groups or associations of farmers, forest dwellers, fisher folk and livestock keepers, NGOs or other civil society organizations, have actively contributed to the improved sustainable use and/or conservation of biodiversity for food and agriculture and the maintenance of ecosystem services.

1. Sharing of breeds (livestock) and varieties (crop) between farmers and livestock keepers is one practice that is common and contribute to the improved sustainable use of BFA
2. Establishment and maintenance of nursery centers of vegetable crops and small genebanks of improved varieties of introduced staple food crop – s/potato is what the farmers' association on South Tarawa do to improve the use and conservation of BFA
3. Fisher folks at the village of some islands in Kiribati have community bylaw that ban the use of some unsustainable fishing practices to use when fished in their island waters/ocean such as the use of outboard motors.
4. Kiribati Organic Farmers Association (KOFA): three atolls in Kiribati now sustainably producing coconut sugar, with the final packing for market done on the main atoll Tarawa.

b) Provide examples of successful inter-ministerial cooperation in the area of conservation and sustainable use of biodiversity for food and agriculture and describe the relevant collaboration mechanisms.

1. The NBSAP National Steering Committee (NSC) and Technical Working Group which is actually a sub-committee of the NSC.
2. The Kiribati Organic Participatory Guarantee Organic Certification Committee
3. The PIPA Management Committee and sub-committees, PIPA Scientific Advisory Committee.

Meetings, workshops are main mechanism for collaboration between the sectors or different ministries

c) Identify possible needs and priorities in terms of policies, programmes and institutions governing biodiversity for food and agriculture, and in particular associated biodiversity and wild food species.

1. **Strengthening the Biodiversity Steering Committee** – Through this committee the program of actions under all biodiversity related conventions is harmonized and coordinated and contributions made to national reporting under the different conventions and treaties. Focal Points are identified their roles under the different biodiversity related conventions & treaties. There needs to be a national focal point for BFA.
2. **Hub for effective co-ordination and facilitation of biodiversity data updates** - Establish co-ordination committee for inputs and information updates.

3.2 Capacity

a) Identify and prioritize training and education needs that target the conservation and sustainable use of associated biodiversity and describe possible constraints.

- Training in biodiversity (BFA) valuations so they can be incorporated into cost-benefit analyses of proposals.
- Improving understanding through education and training of the importance of BFA to agriculture, food security and sustainable development
- Assessment of capacity within relevant ministries and training according to identified needs.

b) Identify and prioritize research needs to strengthen the conservation and sustainable use of associated biodiversity, wild foods and ecosystem services and describe possible constraints.

- A better understanding of the level of agricultural biodiversity that adds resilience to agriculture production from home gardens to larger-scale enterprises.
- Research into propagation and conservation of any wild foods identified as endangered.
- Research to improve guidelines and recommendations for sustainable and resilient agriculture.

IV. Regional cooperation

4.1 Regional initiatives the country is involved in to conserve and use biodiversity for food and agriculture

- a) Describe in Table 7 relevant regional policies and programmes embedding the conservation and/or use of biodiversity for food and agriculture, and in particular associated biodiversity, wild food species and ecosystem services.**

Regional policies and programmes	Description
Pacific Plan	Pacific Forum leaders agreed to the development of a 'Pacific Plan' with the goal to "Enhance and stimulate economic growth, sustainable development, good governance and security for Pacific countries through regionalism. The Plan has reference to 'Improved Natural Resource Management and Environmental Management' in the plans Strategic Objective no. 5, with initiatives being promoted in: sustainable development, fisheries, forestry, coastal waters, waste management, energy, freshwater management, biodiversity and climate change.
The Framework for Nature Conservation and Protected Areas in the Pacific Islands region, 2014-2020	The Framework will provide guidance for the region on key priorities for biodiversity conservation and ecosystem management with clear linkages to NBSAPs and the Aichi Biodiversity targets. Strategic goal C is 'to improve the status of biodiversity by safeguarding ecosystems, species and diversity

Pacific Islands Regional Marine Species Programme 2013-2017	A regional strategy for cooperative conservation and management of dugongs, marine turtles, whales and dolphins in the Pacific Region. Other marine species of conservation concern will be added as the need arise.
A New Song for Coastal Fisheries: Pathways to Change	In March 2015, regional Pacific stakeholders and Governments engaged in collaborative planning to establish a new direction in the management of Coastal Fisheries. A New Song for Coastal Fisheries: Pathways to Change calls for a "...new and innovative approach to dealing with declines in coastal fisheries resources and related ecosystems". The paper makes five recommendations designed to strengthen community-based ecosystem approaches to fisheries management (CEAFM) across the region by adopting a capacity development approach as an integrated strategy, to develop capacity in CEAFM in information, management, monitoring and enforcement functions, from community to national government.
Pacific Islands Regional Ocean Policy and Framework for Integrated Strategic Action (PIROP)	The Pacific Islands Regional Ocean Policy is a policy for all the islands of the Pacific: it has been adopted by the leaders of all Pacific Island countries through the Pacific Islands Forum and is additionally supported by all Pacific Island territories. The Policy underscores the continuing importance of ocean and coastal resources and environments to the region's nations, communities and individuals. Central to the policy is the belief that ocean, coastal and island ecosystems contain high biological diversity that has sustained the lives of Pacific Island communities since first settlement and that it is vital to reduce the negative impacts of human activities and implement measures that protect and conserve biodiversity. It is important that biodiversity protection be pursued in a way that is compatible with community control of resources, and not unduly restrictive of social and economic development, particularly at the community level
Regional Strategic Plan on the Conservation, Management and Sustainable Utilization of Forests and Trees Genetic Resources in the Pacific	Regional Strategic Plan on the Conservation, Management and Sustainable Utilization of Forests and Trees Genetic Resources in the Pacific approved in 2008 by Ministers and Heads of Agriculture and Forestry - serves as the framework for planning and implementing the conservation, management and sustainable use of forest and tree genetic resources with the PICT. One major recommendation from that Regional Strategy and Action Plan is the establishment of the regional tree seed centre
Pacific Ridge-to-Reef Program	Goal of the programme is to maintain and enhance Pacific Island countries' ecosystem goods and services (provisioning, regulating, supporting and
Pacific Regional Action Plan on Sustainable Water Management	One of the three key messages is: Implement strategies to improve the management of water resources, and surface and groundwater catchments (watersheds) for the benefit of all sectors including local communities, development interests, and the environment.

4.2 Needs and priorities

a) **Identify possible needs and priorities in terms of embedding biodiversity for food and agriculture, and in particular associated biodiversity, wild foods and ecosystem services into regional and international initiatives.**

The main priority is improved coordination and information sharing between the different initiatives, highlighting the importance of:

- Clarifying the agency and staff responsible for this area of work which is embedded in different sectors
- Improved monitoring, evaluation, reporting and documentation to ensure information is shared across the initiatives
- Improved national to regional data collecting and reporting mechanisms
- Better knowledge management systems so data collected can be easily accessed and shared between programmes
- Increase in integrated policy planning with a ridge-to-reef /ecosystem/landscape approach
- Improved utilization of regional programmes/initiatives for capacity building

V. Synthesis of needs and priorities and the possible way forward

Table 8 Summary of needs and priorities, and possible actions to be undertaken with respect to the four priority areas of the guidelines

Priority areas	Needs and priorities	Possible actions to be undertaken ⁴
1. Assessment and monitoring	Identification of responsibilities for monitoring and assessing biodiversity for food and agriculture	Mandate a national agency with the role of data collecting, monitoring and assessing biodiversity for food and agriculture (e.g. agriculture or environment or both)
	Identification of clear goals for monitoring and assessing biodiversity for food and agriculture	Integrate assessment and monitoring of biodiversity for food and agriculture into national strategic plan
	Monitoring of established or newly introduced species specifically for pests (weeds, pathogens, invertebrates)	Establish monitoring and effective emergency response systems
	Monitoring of effectiveness of management decisions	Design/adopt systems to monitor the impacts of management decisions on

⁴ Reference: questions 92, 93, 94, 95, 96 and 97 of country report guidelines.

	on biodiversity for food and agriculture, at national and regional levels	biodiversity for food and agriculture
2. Conservation and sustainable use	Understanding of how ecosystem approaches can contribute to the conservation of biodiversity for food and agriculture	Evaluate ecosystem approaches and engage existing projects to contribute to information pool
	Access to information on the sustainable conservation of biodiversity for food and agriculture	Develop/adapt knowledge management systems at national and regional levels
	Knowledge on conservation techniques (in situ and ex situ) with emphasis on in situ BFA	Collate knowledge on both in situ and ex situ conservation practices, and address capacity needs Conduct community training and awareness-raising regarding value of biodiversity for food and agriculture
	Conservation strategies	Develop a rational conservation strategy for BFA addressing resource constraints, in particular funding and capacity of existing facilities
3. Policies, institutions and capacity	Recognition of importance of BFA	Source, document and disseminate success stories by social media and education programmes
	Knowledge/information on policies that address BFA at the national and regional levels, identifying opportunities to address BFA issues	Review current policies for acknowledgement of BFA, and achievable goals and ensure policies are harmonized
	Coherent policies and programmes that inter-link the sectors (Agriculture, Environment, Education, Health, Forestry, Fisheries, Community, etc.)	Promote the development of cross-sectoral policies and programmes at all levels through establishment of a cross-sectoral working group taking into account existing efforts.
	Implementation of	Strengthen capacity at the

	existing policies	national and local level to implement policies Engage and empower communities in the development and implementation of relevant policies
	Coordination of responsibilities across agencies addressing BFA	Identify best institutional mechanisms to coordinate responsibilities across relevant agencies
	Information hub for research priorities, contactable people and funding sources in the PICTs for BFA	Establish/strengthen information hub to collect, maintain and disseminate information on research priorities, contactable people and funding sources
	Assessment of capacity and identification/prioritization of training needs at the national level	Implement training programs according to needs identified and available resources
	Capacity building in access and benefit-sharing	Establish guidelines and mechanisms to assist countries in access/exchange activities
4. Regional and international cooperation	Enhanced regional and international collaboration	Improve coordinating mechanism(s) between regional agencies Establish systems for sharing knowledge and resources amongst the agencies Consider establishing a regional coordination post, possibly based in FAO